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CROP TALK

OMAFRA Field Crop Specialists—Your Crop Info Source

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Narrow Row Corn

by Greg Stewart, Corn Specialist, OMAFRA, Guelph

I continue to get quite a few questions on narrow row corn so I thought I would review some of the results again. A study from Michigan State University (William Widdicombe and Kurt Thelen) emphasizes some important points.

Michigan Study

This study from nearby Michigan included 11 test sites over two years (1998 and 1999), with various hybrids, 3 row widths (30", 22" and 15") and five plant populations ranging from 22,400 to 36,000 plant per acre. The study points to a consistent increase of 2% in yield for 22 inch rows over 30 inch rows and a 4% increase for 15" rows to 30 inch rows (refer to Table 1). This yield increase due to row widths is more than others have reported, especially from the Northeast where it has been rare to see consistent narrow row response. However, it is a more modest yield advantage than the 8% increase that was talked about through the early nineties and which served as incentive for some of the early adopters to switch to narrow rows.

A wide range of plant populations were used within each row width. There was no population by row width interaction. That is, increased plant population boosted corn yields in a similar fashion in both the wide and narrow rows. Interestingly, the yield **increases due to increasing plant density were of a similar nature as the increase due to narrowing row widths** (refer to Table 2).

Ontario Ministry of Agriculture, Food & Rural Affairs, Crop Technology Branch

Agricultural Information Contact Centre: 1-877-424-1300
Publication Order Centre: 1-888-466-2372
Northern Ontario Regional Office: 1-800-461-6132
OMAF Web Site: www.gov.on.ca/omafra/english/crops

Hybrids used in this study were selected based on maturity, characteristics in ear type (flex, determinate, indeterminate), leaf orientation (erect, semi-upright, wide) and plant height (short, medium, tall). As in most studies, the hybrid selected had a significant impact on yield, but there were no particular hybrids that did better in narrow rows. In other words, hybrids that yielded better in wide rows also yielded better in narrow rows. However, there were differences in the way hybrids responded to the various populations. The researchers could not explain hybrid response to population by examining the aforementioned characteristics (ear type, height, leaf angle).

Switch To Narrow Rows?

So as you ponder this most recent report, you may be considering a switch to narrow rows. I generally have been of the opinion that it takes a system approach to pay for the narrow row conversion. If the twenty inch planter is also going to do soybeans and edible beans, and do them better with less seed cost, then perhaps you can pencil it out. However, if the planter, tire and header conversions all need to come out of a 2 – 4 % increase in corn yield, then I am not very excited about the idea. More to the point from this data set is the fact that you first should be optimizing your productivity based on plant population where the extra capital costs are zero and the yield responses are similar to narrowing rows.

Seeding Rate Adjustments

Perhaps the changes to your corn planter for this winter should be an accurate acreage meter and an accurate variable rate seed drive. I am not suggesting a GPS driven variable rate seeding system, just one that allows you the flexibility to adjust seeding rates from the tractor cab with confidence for a range of conditions. What conditions? Here are my suggestions for conditions that may require more seeding rate adjustment than you have traditionally done.

1. Yield potential
   - most notably water availability
2. Hybrid response to population
   - rely little on "hybrid characteristics" such as flex ear and more on actual population results
3. Time of planting
   - early season better than late season
4. Planting conditions
   - boost seeding rates under tough soil conditions even if it is only on half the field
5. Improved soil conditions
   - if you have done deep tillage or boosted fertility a higher seeding rate may be a good indicator if you really have made any difference in yield potential

Table 1. Row width effect on grain yield when averaged across plant populations, hybrids, locations and years. Each value is the average of 880 observations.

Row Widths	Yield (bu/ac)
30 inches	177
22 inches	181
15 inches	184

Source: W. D. Widdicombe and K. D. Thelen, Agronomy Journal 94:1020-1023 (2002)

Table 2. Plant population effect on grain yield when averages across hybrids, locations row widths, locations and years. Each value is the average of 880 observations..

Plant Population (plants/acre)	Yield (bu/ac)
22,400	168
26,000	177
29,200	181
32,400	184
36,000	186

Source: W. D. Widdicombe and K. D. Thelen, Agronomy Journal 94:1020-1023 (2002)

Soybean Variety Information & Performance Profile

by Horst Bohner, Soybean Specialist, OMAFRA, Stratford

Internet Tool

Each year the Ontario Oil and Protein Seed Crop Committee (OOPSCC) assesses soybean varieties for traits such as yield, lodging, seed weight, height, SCN resistance and more. Trials are set up from the very southwest to as far north as New Liskeard. This information is the most comprehensive comparison of Ontario soybean varieties available.

Now it's become even more practical to use this information. If you have access to the internet you can customize your search to compare yields and traits of the varieties that are of most interest to you. By visiting www.oopscc.org/vipp_home.html you can quickly create head-to-head comparisons with the varieties you choose. The site is also available by following the links from the OOPSCC web page at www.oopscc.org. This powerful tool is called the **Variety Information & Performance Profile.**

For example, let's assume you want to compare OAC Wallace to S 08-80. The following chart shows part of the tables that are generated when you select those two varieties from the program. The tables below are actually from 2004, but the 2005 variety information will become available in early December. Up to 5 varieties can be compared at one time. Check out this tool before making variety decisions for 2006.

Variety	Hilum Colour	Flower Colour	Pubesc. Colour	Heat Unit Rating	Other Traits	Distributor
OAC Wallace	Brown	Purple	Tawny	2750		SeCan Association
S 08-80	Imperfect Yellow	Purple	Tawny	2800	PRR Resist. Gene: **1c**	Syngenta Seeds Canada Inc

Results for 2800 Heat Unit Zone (Conventional Variety Test)

		1 year average	2 year average	3 year average	4 year average	5 year average
Days to Mature	**OAC Wallace**	**119.8**	**116.4**	**115.5**	**116.3**	--
	S 08-80	**122.5**	**118.6**	**116.5**	**116.6**	**118.5**
	2800 Conv Test Avg.	124.6	120.4	118.1	119.1	120.8
Yield (bu/ac)	**OAC Wallace**	**59.6**	**56.4**	**56.6**	**52.1**	--
	S 08-80	**56.7**	**55.5**	**55.2**	**49.3**	**50.5**
	2800 Conv Test Avg.	56.1	54.8	54.8	49.1	49.8

Variety Selection

a. Don't compromise on variety selection. The single most important yield increasing decision you can make is to choose the best varieties suited for your farm. A tremendous effort is spent each year to gather yield data for Ontario varieties. Take advantage of this information.

b. Try something new. Every producer should be assessing at least one new variety per year. But don't leave behind the tried and true. Plant more than just 2 varieties for one operation. Fifty acres of one variety is lots for the medium sized grower. Two or three varieties in fields up to 150 acres, and three to five varieties with more than 150 acres.

c. Choose a variety that fits your CHU area. Don't push the envelope too far on this. There are those who are planting soybeans 300 CHU longer than what's recommended for their area. This worked in 2005 but that doesn't mean it will work next year. It's not always an advantage to have very long day beans. If you look at how well some of the shorter day beans perform it's worth spreading the risk with respect to CHU as well. For example, in Kansas and other southern states they have lots of heat units but often yields much lower than ours. They are experimenting with using Ontario short season (for them) beans, with very good success.

d. Know the disease issues in your fields. SCN, white mould etc. Choose appropriate varieties.

e. Talk to your neighbours.

Control Options for Group II Resistant Weeds in Soybeans

by Mike Cowbrough, Weed Specialist, OMAFRA, Guelph & François Tardif, University of Guelph, & Peter Sikkema, Ridgetown College, University of Guelph

In Ontario there are now several different weed species resistant to group II herbicides. Over the past 3 years, field research trials have looked at alternative control options in conventional (non-Roundup Ready) soybean. The following tables provide a list of different herbicide programs with the rates that each program was tested at, average weed control and the range in weed control amongst the field trials. The intent of these tables is to provide a list of effective herbicides for managing group II resistant weeds. Always refer to OMAF Publication 75 - Guide to Weed Control and the manufacturer's product label for specific information on any of the herbicide treatments shown in the six tables.

1. EASTERN BLACK NIGHTSHADE

Weed Staging: Weeds had not emerged for the pre-emergent (pre) treatments and were at the 4-leaf stage at the time of application for the post-emergent treatments.

Table 1. Group II resistant eastern black nightshade control, the range in control over two years, and the timing and product rate of various herbicide programs.

Product (Timing and Rate per acre)	Control (%)	Range (%)
Axiom (pre - 0.34 kg/ac)	83	70-95
Broadstrike Dual Magnum (pre - 0.624 L/ac)	85	78-91
Dual II Magnum (pre - 0.7 L/ ac)	85	76-93
Frontier (pre - 0.56 L/ac)	81	70-91
Dual II Magnum (pre - 0.7 L/ ac) + Blazer (post - 1 L/ac)	95	90-99
Dual II Magnum (pre - 0.7 L/ ac) + Reflex (post 0.4 L/ac)	97	94-99
Lorox L (pre- 1.87 L/ac)	99	99
Blazer (post - 1 L/ac)	80	68-99
Reflex (post - 0.4 L/ac)	83	73-98

A summary of 2 trials conducted by Peter Sikkema in 2002 and 2003.

Bottom Line: There are numerous products that will provide over 80% control of eastern black nightshade. In general, the level of control is proportional to the herbicide program's cost. Applications of Lorox L, Dual II Magnum followed by Blazer or Reflex provided the best and most consistent control of eastern black nightshade, but are also the most expensive.

2. COMMON COCKLEBUR

Weed Staging: Weeds were between the cotyledon and 5-leaf stage at the time of application.

Table 2. Control of group II resistant common cocklebur and the timing and product rate of various herbicide programs.

Product (Timing and Rate per acre)	Control (%)
Basagran Forté (post - 0.9 L/ac)	92
Blazer (post - 1 L/ac)	91
Reflex (post - 0.4 L/ac)	63

One field trial conducted by Peter Sikkema in 2001.

Bottom Line: Both Blazer and Basagran Forté provide good control of common cocklebur.

3. PIGWEED SPECIES

Weed Staging: Weeds had not emerged for the pre-emergent (pre) treatments and were up to the 10-leaf at the time of application for the post-emergent treatments.

Table 3. Control of group II resistant pigweed and the timing and product rate of various herbicide programs.

Product (Timing and Rate per acre)	Control (%)
Blazer (post - 1 L/ac)	78
Blazer (post - 0.5 L/ac + Assist Oil)	69
Broadstrike Dual II Magnum (pre - 0.624 L/ac)	99
Boundary (pre - Dual II Magnum (0.54 L/ ac) + Sencor (0.27 kg/ac))	99
Frontier (pre - 0.56 L/ac)	99
Lorox L (pre - 1.87 L/ac)	99
Reflex (post - 0.4 L/ac)	59
Sencor 75 DF (pre - 0.3 kg/ac)	99

One field trial conducted by Peter Sikkema in 2002.

Bottom Line: The post-emergent herbicides have tended to provide inconsistent control of pigweed. Therefore, a soil applied herbicide program should be used to target group II resistant pigweed.

4. COMMON RAGWEED

Weed Staging: Weeds had not emerged for the pre-emergent (pre) treatments and were up to 10-leaf stage at the time of application for the post-emergent treatments.

Table 4. Group II resistant common ragweed control, the range in control over two years, and the timing and product rate of various herbicide programs.

Product (Timing and Rate per acre)	Control (%)	Range (%)
Axiom (pre - 0.34 kg/ac)	54	18-91
Boundary (pre - 0.54 L/ac Dual + 0.27 kg/ac Sencor)	64	8-97
Boundary (pre) + Blazer (post - 1 L/ac)	78	18-99
Boundary (pre) + Reflex (post - 0.4 L/ac)	83	38-99
Lorox L (pre - 1.87 L/ac)	83	68-96
Sencor 75 DF (pre - 0.3 kg/ac)	64	4-90
Blazer (post - 1 L/ac)	51	35-79
Reflex (post - 0.4 L/ac)	85	75-99

A summary of 4 trials conducted by Peter Sikkema in 2002 and 2003.

Bottom Line: Although not incredibly common, populations of triazine resistant common ragweed do exist. Therefore, products that contain metribuzin (i.e. Boundary, Sencor) will not control common ragweed. Furthermore, it would appear that when metribuzin is applied to triazine resistant common ragweed, "rescue" treatments with Blazer or Reflex have been ineffective. This may be because the weeds have been "hardened off" by the initial metribuzin application. If you are confident that triazine resistance is not an issue, then Boundary alone or Boundary followed by Reflex will provide good control of common ragweed. If common ragweed is both resistant to triazine and group II herbicides, then a post-emergent application of Reflex will provide the most consistent level of control.

5. GREEN FOXTAIL

Weed Staging: Weeds had not emerged for the pre-emergent (pre) treatments and were up to the 4-leaf stage at the time of application for the post-emergent treatments.

Table 5. A two-year average of group II resistant green foxtail control, the range in control over two years, and the timing and product rate of various herbicide programs.

Product (Timing and Rate per acre)	Control (%)	Range (%)
Axiom (pre - 0.5 kg/ac)	80	75-84
Dual II Magnum (pre - 0.7 L/ac)	87	78-96
Frontier (pre - 0.56 L/ac)	97	96-97
Poast (post - 0.19 L/ac)	99	99

A summary of 2 trials conducted by François Tardif in 2002 and 2003.

Bottom Line: Any of the soil applied grass herbicides will provide good control of group II resistant green foxtail. Alternatively post-emergent grass herbicides (i.e. Poast) will also provide good control of green foxtail.

6. COMMON LAMB'S-QUARTERS

Weed Staging: Weeds were at the 4-leaf stage at the time of application for the post-emergent treatments.

Table 6. Control of group II resistant common lamb's-quarter's, the range in control over two years, and the timing and product rate of various herbicide programs.

Product (Timing and Rate per acre)	Control (%)
Basagran Forté (post - 0.9 L/ac)	99
Blazer (post - 0.5 L/ac + Assist Oil)	50
Reflex (post - 0.4 L/ac)	32

A summary of 1 trial conducted by François Tardif in 2002.

Bottom Line: Of the post-emergent products, only Basagran Forté provided adequate control of common lamb's-quarters. However Basagran Forté must be applied to very small common lamb's-quarters (4 leaf or less) and at the high rate to achieve the level of control shown in Table 6. Although not tested, soil applied applications of Sencor or Lorox L should provide good control of common lamb's-quarters, unless the species is also resistant to triazine (i.e. Sencor) herbicides.

Suspicious that you may have resistant weeds?

If you are seeing:

- A weed species that should have been controlled but is healthy while other susceptible species have been controlled
- A weed control failure even when the correct herbicide rate was used and it was applied at the appropriate weed stage and under favourable environmental conditions

Then stop a potential problem from getting worse. If you see weeds that you suspect are resistant, report them by calling the Agricultural Information Contact Centre at **1-877-424-1300**

By taking advantage of this toll-free number, suspicious weed species will be tested for resistance by the University of Guelph. Any information obtained from this service will allow weed researchers to develop control options for resistant weed populations.

Considered Yet How to Fertilize the 2007 Corn Crop?

by Ian McDonald, OMAFRA and Bill Deen, University of Guelph

No we didn't miss a year! This may be the time to think about how you're going to fertilize the 2007 corn crop. Nitrogen and fuel prices are hitting all time highs and commodity prices are low. We need to think about alternatives to applying all the nitrogen to corn as commercial fertilizer.

Underseeding Red Clover

While many corn producers do not have manure nitrogen, they do have other options for nitrogen, in particular red clover. In Ontario, the acres of winter wheat and spring cereals that are underseeded to red clover has steadily declined. This is due to concerns over potential interference with cereal harvest, effects on straw quality, cost of red clover establishment, and poor or inconsistent stands. The poor and inconsistent red clover stands that seem to be more prevalent than a decade ago are typically attributed to increasing wheat yields. However, many producers are growing high yielding wheat crops and also getting excellent red clover establishment. Other factors such as tillage systems, wheat varieties, nitrogen, fertility, and soil type also seem to influence red clover establishment. Research is underway to develop management systems to improve red clover stands.

Red clover stand variation may not be a major issue. Several previous studies indicate that red clover biomass and the amount of nitrogen available to the next crop are not strongly correlated above a minimum level of red clover growth.

The amount of nitrogen credit is more than you might think and can make a significant contribution to the following year's corn crop nitrogen requirements. Previous recommendations have underestimated red clover's contribution to corn nitrogen requirements.

Calculating Nitrogen Credits

Using the **Ontario Corn Nitrogen Calculator** (www.gocorn.net) and estimating the nitrogen (N) requirements to grow 130 bu/ac of corn in a 2750 CHU zone across 3 different soil textures we get the numbers in Tables 1 and 2. Table 1a is the Maximum Economic Rate of Nitrogen (MERN) recommended assuming a nitrogen price of $0.42 per lb (2005 average estimate) and corn at $2.70/bu. Table 1b is the same, except that the nitrogen price is $0.34/lb, which is more similar to what we were paying in 2004. Next year's nitrogen price is a mystery, although we are pretty sure of which direction it will be going.

The amount of nitrogen recommended across all soil types and crop rotations declines as the price of nitrogen increases (Table 1a vs. 1b). If the price of nitrogen continues to increase, the nitrogen rate will continue to decline, since the cost of the additional nitrogen is not captured by sufficient increase in crop yield. The crop price will also impact the nitrogen rate. Try different scenarios yourself by downloading the calculator from the website.

The Corn Nitrogen Calculator was developed by summarizing 40 years of nitrogen research and validated with 120 site-years of on-farm strip trial data from 2001-2004, providing a high level of confidence.

Table 1a: Predicted Nitrogen Requirements Determined by Ontario Corn Nitrogen Calculator With N @ $0.42 / lb												
	Clay Loam				Sandy Loam				Loam			
Prev Crop	grain corn	soybean	wheat	ww + rc	grain corn	soybean	wheat	ww + rc	grain corn	soybean	wheat	ww + rc
	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇
Estimated N Req. (lbs/ac)	115	88	104	42	113	86	102	40	108	81	97	35
Based on Expected Yield 130 bu/ac, Corn Price $2.70/bu, N Cost $0.42/lb, CHU 2750, N applied Preplant												

Table 1b: Predicted Nitrogen Requirements Determined by Ontario Corn Nitrogen Calculator With N @ $0.34 / lb												
	Clay Loam				Sandy Loam				Loam			
Prev Crop	grain corn	soybean	wheat	ww + rc	grain corn	soybean	wheat	ww + rc	grain corn	soybean	wheat	ww + rc
	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇
Estimated N Req. (lbs/ac)	125	99	115	52	123	97	113	50	118	91	107	45
Based on Expected Yield 130 bu/ac, Corn Price $2.70/bu, N Cost $0.34/lb, CHU 2750, N applied Preplant												

Cost Benefits

The nitrogen contribution of red clover in all the soil types is significant. Comparing a previous crop of corn to that of winter wheat/red clover shows a 72 lb/ac N benefit to having a uniform stand of red clover in the system. Even compared to soybeans as the previous crop, red clover in the winter wheat gave a benefit of 47 lbs/ac of N. If corn was following wheat and required 104 lbs/ac of N compared to needing only 42 lbs/ac if red clover had been included, the cost savings was considerable. At $0.42/lb of N the fertilizer cost difference is $26.04/ac (104 - 42 lbs N/ac x $0.42/ lb N). The cost of getting the red clover in would be about $10/ac for seed (6 – 8 lbs/ac x $1.25/lb) and possibly $5 - 8/ac for application. The net benefit of the red clover could be $8 - 16/ac. On 500 acres of corn, that would be a savings of $4,000 – 8,000.

All that is great, but we have to consider the costs and risks as well. The risk would be getting a uniform stand of red clover. There is also a cost associated with managing the red clover by tillage or herbicide. These costs depend on the changes that would be required in your system. If you fall plow, then no additional cost occurs. If you are a no-tiller and have to add another herbicide into the system, costs increase. The other negative is that although on average we expect 72 lbs/ac of nitrogen contribution to the next crop, poor spring conditions can lower that level or delay its availability.

Weather Impacts On N Availability – The Good

The Long Term Crop Rotation Trial at Elora is summarized in Table 2. To profile extremes in spring weather and the impact on red clover nitrogen availability we use 1998 and 1996. In 1998, when the spring weather was good for crop growth and nitrogen mineralization (#1), the inclusion of red clover in the rotation previous to corn resulted in a high level of available nitrogen in the soil on June 1st of the corn year. The nitrogen recommended from the PSNT and confirmed using MERN at the end of season, was 0 lbs N/ac (#2).

It is interesting that the nitrogen advantage from the red clover was equal to having two years of alfalfa in the rotation previous to the corn. This would suggest that the inclusion of red clover for a March to November period of a single year gave an equal benefit as a longer term forage rotation.

Weather Impacts On N Availability – The Bad

The risk of relying on nitrogen contribution from red clover occurs when the spring weather is poor, as experienced in 1996. The nitrogen available from the red clover was significantly lower than in 1998 (#3), and was not close to meeting the requirements. In this situation, 107 lbs/ac of additional nitrogen was recommended, and 110 lbs/ac (#4) was the actual MERN. The benefit from having red clover in the rotation, despite a uniform stand, was not much better than a narrow rotation of corn following soybeans or even continuous corn. The nitrogen in the red clover likely became available later in the season, but would have been of negligible value to the corn crop. Corn has its big nitrogen demand from late June to late July.

Keep in mind that the spring weather in 1996 was extreme. What this does suggest is that when

Table 2. Impact of Previous Crop and Weather Effects on PSNT Nitrate Conc., Fertilizer Needs and Yield Response			
Previous Two Year Crop Sequence	June 1st PSNT Soil Nitrate Conc. (ppm)	Recommended N Rate Based on PSNT (lbs-N/ac)	N Required Based on Yield Response (lbs-N/ac)
1996			
Continuous Corn	6	150	135
Soys - Wheat	7.3	140	130
Soys-Wheat (RC)	10.9	107	110
Alfalfa - Alfalfa	12.1	100	110
1998			
Continuous Corn	10.8	108	105
Soys - Wheat	17.6	50	35
Soys-Wheat (RC)	29.1	0	0
Alfalfa - Alfalfa	31.4	0	0
From Elora Long Term Rotation study, U of G			

incorporating organic sources of nutrients into the production system, more management has to occur. We should include a starter nitrogen program to ensure that early growth is not limited. When a cool backwards spring occurs, be prepared to conduct a PSNT test in June to ensure that sufficient nitrogen is available. If not, we need the ability to apply commercial nitrogen to overcome the organic source shortfall.

Other Benefits

Other benefits of red clover are more difficult to quantify but do make a positive contribution to the overall health and productivity of the crop rotation. These include addition of organic matter, improvements in soil structure and water holding capacity, and weed suppression.

Next issue we will explore some of the production techniques that may help create a vigorous, uniform stand of red clover when seeded into next springs wheat fields.

What Does $500 Nitrogen Mean For Spring Wheat?

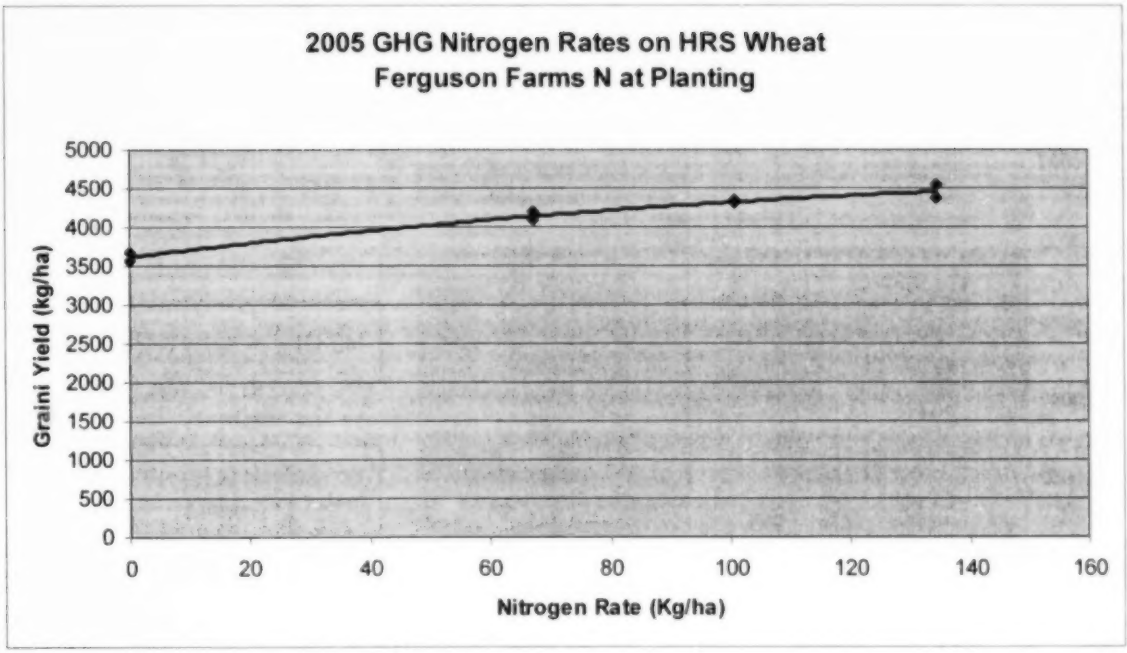
by Scott Banks Emerging Crop Specialist, Kemptville OMAFRA

Nitrogen prices for 2006 are forecast at over $500 per tonne of urea. Hard red spring wheat prices for the 2006 crop have been hovering around $180 per tonne ($162 [a] plus $18 protein premium). Recommended nitrogen rates need to be re-evaluated based on higher N prices.

Two, 3 year projects looking at "Nitrogen Rates On Hard Red Spring Wheat", were recently completed in eastern Ontario. This projects evaluated the efficient use of nitrogen in spring wheat production by assessing the yield, grain protein and economics at various nitrogen rates. One project also looked at the timing of nitrogen application. The Most Economical Return for Nitrogen (MERN) was calculated for each site. The MERN is the rate where applying more nitrogen will not produce enough additional yield to pay for the additional nitrogen applied.

Kevin Ferguson of Osgood, John Nanne of Pakenham, Cliff Pringle of Napanee, and several other farm co-operators put in plots with actual

Graph 1



If N is $0.90/kg ($0.41/lb) MERN = 92 kg/ha (83lbs/ac)
If N is $1.15/kg ($0.52/lb) MERN = 70 kg/ha (64 lbs/ac)

nitrogen rates of 0, 60, 90 and 120 pounds per acre (lbs/ac). At the Ferguson site, the project varied the N application timing and the N rates applied, as well as split applications of 30, 60, 90 lbs/ac at planting, followed by 30 lbs/ac applied at the "tillers formed stage" of the wheat (Zadok's 22). Urea was used at most of the sites. Graph 1 shows the yield response to the four nitrogen rates applied at planting at the Ferguson Farms site in 2005.

Reduction of 20 lbs/ac N

Over the three years and site the data from the project showed the MERN is about 90 lbs/ac at a traditional urea price of $420 per tonne. However, with the higher nitrogen prices forecasted for this spring, the MERN is 70 lbs/ac when urea is at $500 per tonne. This is a reduction of 20 lbs/ac of nitrogen.

No Improvement from Splitting Applications

The project showed that only a slight reduction in nitrogen required resulted when applying some of the urea at "tillers formed stage" of the wheat (Zadok's 22) versus applying all the urea at planting. Split applications of urea did not reduce the MERN.

Consider N Credits for Previous Manure & Legumes

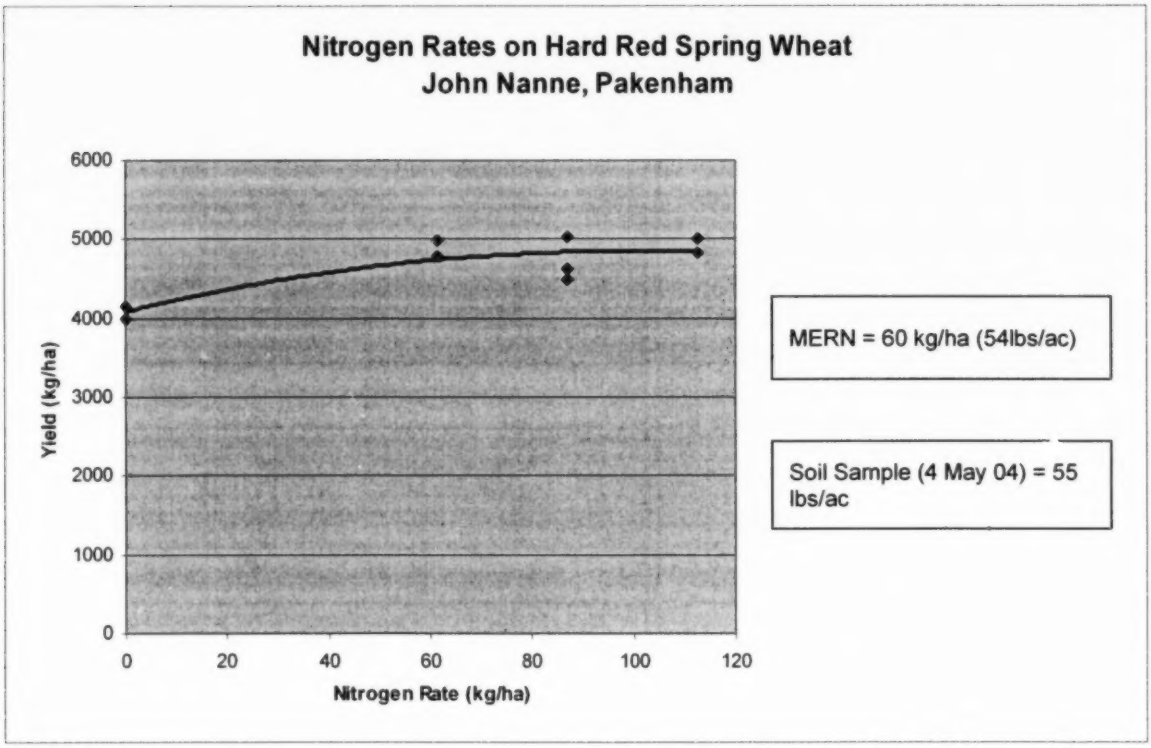
Fields with a history of manure or legumes crops have lower MERN values and nitrogen rates should be adjusted. While not perfect a soil nitrogen sample taken at planting to a depth of 12 inches, can aid in determining the nitrogen rate to be applied. At John Nanne's site, the field has a history of manure and alfalfa in previous crop rotations. For this field, Graph 2 shows a MERN of 53 lbs/ac. The soil nitrogen sample was taken at planting and indicated that there was 55 lbs/ac. of nitrogen available in the soil to the wheat crop. Using the plant uptake value of 120 lbs/ac of nitrogen (2.1 lbs of N per bu of grain), then adjusting the rate by the soil nitrogen sample would have recommended (120-55)= 65 lbs/ac. This would give a saving of (90-65=25lbs N @ $0.52/lb) $13.00 per acre in nitrogen costs.

Grain Protein

The MERN at all sites was sufficient to maximized the grain protein premium of 12.5%

Funding for these projects was provided by the Green House Gas program and the Ontario Soil & Crop Improvement Association.

Graph 2



[a] Report by FARM MARKET NEWS, Ridgetown College from September to October

Available Nutrients For Manure From Various Livestock Types

by Christine Brown, Nutrient Management Field Crop Lead, OMAFRA, Woodstock

Nutrients from manure have an economic value. With energy prices increasing, the processing and transportation cost of commercial fertilizers is making them more expensive. This is making nutrients from manure a more sought-after commodity. In addition to the nutrient benefits, the micro nutrient content and the organic matter benefits to the soil gives manure a value-added component that it is difficult to determine an exact dollar value for.

Tables 1 and 2 give an indication of the available nitrogen, phosphorus and potassium from various livestock types. The information is based on average analysis results for over 3,000 samples. The information in the tables has been grouped by livestock type on an "as-is" basis. There are large variations between manures, so a manure analysis is still your best guide to nutrient availability. Variation in dry matter, therefore nutrient concentration, is determined by the type and amount of bedding used, the feed ration, and the type of storage. Generally, the higher the moisture content of the manure, the less concentrated the nutrient content. The relative concentration of phosphorus is higher in solid manure, while potassium is higher in liquid manure. A few of the micro nutrients have also been included to give an indication of the levels found in manure. There is a wide range, even within livestock types, that vary mainly with micronutrients fed in the ration.

A few assumptions are made in the tables. The useable nitrogen is the amount of nitrogen available in the year of application, assuming the manure is spring applied and incorporated within 24 hours. There is also some nitrogen that is available in subsequent years, and this is higher in solid manures than in liquid manures. The value of the nitrogen is reflected in the column that reads

"Value Year 2-4", which also reflects half of the total available phosphorus value.

The actual immediate nutrient value for crop production will be less than what is reflected in the tables if the nutrients being applied are not required for the production of the crop. An example of this is when nitrogen is applied to a legume crop, or when phosphorus and/or potassium is applied to a field with soil tests higher than 30 mg/L (ppm) or >150 mg/L (ppm) for P and K respectively.

The manure value is based on the purchase price of an equivalent amount of mineral fertilizer (October 2005). The micro nutrient and organic matter values are not reflected in the tables.

For more detailed tables visit the nutrient management section on the OMAFRA website at www.omafra.gov.on.ca/english/agops/index.html.

Table 1: Available Nutrients and Fertilizer Equivalent Value of Various Types of Livestock Manures

Manure	Average Dry Matter %	Available N [1] Spring 1 day	Available N [2] Spring not incorp.	Available [3] P205	Available [4] K20	Value [6] Year 1	Value [6] Year 2-4
	Kg/1,000 L (lb/1,000 gal)					$/1000 gallons	
Liquid dairy	8.5	1.6 (16)	.9 (9)	.8 (8)	2.6 (26)	18.10	5.00
Liquid hog	3.8	2.3 (23)	1.2 (12)	1.2 (12)	1.8 (18)	20.90	6.00
Liquid poultry	10.6	5.0 (50)	2.7 (27)	2.8 (28)	3.2 (32)	44.30	13.70
	kg/tonne (lb/ton)					$/ton	
Solid poultry	52.6	9.5 (19)	7.5 (15)	10 (20)	12.5 (25)	24.20	11.15
Solid dairy	24.2	1.7 (3.4)	1.2 (2.3)	1.5 (3.1)	5.4 (10.8)	5.90	2.05
Solid beef	28.6	1.7 (3.4)	1.3 (2.6)	2.1 (4.2)	6.2 (12.3)	6.75	2.75
Sheep	31.3	2.3 (4.5)	1.5 (3.0)	2.5 (5.0)	7.5 (15.1)	8.35	3.00
Horse	34.0	1.1 (2.1)	.75 (1.5)	1.2 (2.4)	3.9 (7.8)	4.15	1.55

[1] Nitrogen based on spring application, incorporated within 24 hours
[2] Nitrogen based on spring application, (soil surface, not incorporated)
[3] Phosphate from manure or biosolids is assumed to be 40% as available in the year of application as that in commercial fertilizer (another 40% of the phosphorus is available the following year)
[4] Potassium from manure is assumed to be 90% as available in the year of application as that in commercial fertilizer
[5] Data from manure analysis provided from Ontario Labs collected between 1992 and 2004
[6] Value based on spring application, incorporated within 24 hours with N-P205-K20 prices (Oct 2005) of $0.48 - $0.41 - $0.275 /lb

Table 2: Average Nutrient Contents of Livestock Manures

Manure Type		Dry Matter	Total N	NH4-N	P	K	Ca	Mg	Zn	Cu	Mn
	(number of samples)	%	%	ppm	%	%	%	%	ppm	ppm	ppm
DAIRY	liquid (860)	8.5	0.36	1,527	0.09	0.24	0.49	0.14	48	17	40
	solid (150)	24.2	0.61	1,278	0.17	0.50	1.54	0.36	95	29	107
SWINE	liquid (924)	3.8	0.40	2,648	0.13	0.17	0.12	0.06	85	30	22
	solid (54)	29.8	0.90	2,582	0.47	0.56	--	---	172	103	--
POULTRY	liquid (137)	10.6	0.83	5,581	0.3	0.3	1.6	0.08	70	11	64
	solid (623)	52.6	2.37	5,495	1.11	1.17	4.6	0.28	238	33	204
BEEF	liquid (81)	7.95	0.52	1,794	0.13	0.43	0.7	0.3	57	14	61
	solid (176)	28.6	0.73	1,011	0.23	0.57	1.5	0.41	129	36	112
SHEEP	solid (54)	31.3	0.76	1,862	0.27	0.70	1.5	0.38	170	20	140
HORSE	solid (32)	33.41	0.42	684	0.13	0.36	1.7	0.56	73	23	113

Data from manure analysis provided from Ontario Labs collected between 1992 and 2004
Micro nutrient data is obtained from a smaller subset of data

Winning The War on Pests in Edible Beans

by Brian Hall, Edible Beans & Canola Specialist, OMAFRA

Beginning in 2006, edible bean growers will have access to a new tool for fighting an old nemesis, the potato leafhopper (PLH). The potato leafhopper is the most serious pest of edible beans, with damage each year exceeding $3 million. PLH feeding can be very damaging reducing growth and vigour of plants.

Thiamethoxam (Cruiser)
A new seed-applied insecticide, thiamethoxam (Cruiser) from Syngenta Crop Protection, provides early-season control of PLH. In trials conducted by Ridgetown College, control of PLH lasted for up to 4-6 weeks after planting. In some years, this could provide season-long control, but not in others. It will eliminate the need for at least one foliar application.

Thiamethoxam is a neonicotinoid insecticide, similar to imidacloprid, as found in Gaucho. Thiamethoxam has systemic activity, translocating throughout the plant. When an insect is exposed to thiamethoxam it is incapacitated and stops feeding within several hours, preventing further plant damage. Thiamethoxam has an excellent safety profile and is regarded as an alternative to organophosphate seed treatments, such as lindane. Growers will need to continue to scout their dry bean fields up to first flower in order to determine if foliar control will be required.

Early PLH Control
In 2005, PLH populations were very low in many dry bean growing regions of Ontario. Fewer storm fronts from the USA during the growing season reduced the number of PLH being carried into Ontario. Threshold populations of PLH were not reached in many areas, reducing or eliminating the need for foliar control.

In previous years, leafhoppers often arrived early in the season shortly after emergence of the beans. Scouting for this early population of leafhoppers is difficult, because the first PLH, are all adults which are very mobile and hop or fly away when disturbed. Severe yield loss occurs before hopperburn is seen, particularly in seedling beans. The difficulty in finding leafhoppers at this stage, results in fields not being sprayed that required it. Thiamethoxam will help to control this early population.

Wireworm & Seedcorn Maggot
Thiamethoxam also provides good control of wireworm and seedcorn maggot. However, it should be noted that using a seed insecticide does not guarantee 100% control of soil insect pests. Under heavy pressure, some injury should be expected. Fields at higher risk are those with heavy annual weed pressure, sandy soils, following sod or pasture, or fields recently out of pasture, or sod. In the spring, the risk is higher in fields where manure or green residue was recently incorporated.

Fall Rye For Silage or Grazing

by Joel Bagg, Forage Specialist, OMAFRA, Lindsay

Fall rye is a cereal best known for its ability to provide a cover crop that prevents erosion while also providing good weed suppression. Fall rye can also be used successfully as a forage crop, by grazing in the fall and spring, or by harvesting as haylage in May. Because fall rye is typically harvested as silage in southern Ontario from early-May, there are some opportunities to include it in "double crop" systems. Do not confuse cereal rye (*Secale cereale*) with ryegrass (*Lolium multiflorum or L. perenne*), which are totally different grass species with quite different characteristics.

Advantages & Disadvantages
Rye is very cold tolerant and is the hardiest and most disease resistant of the winter cereals. Fall rye is earlier and faster growing in the spring than the other winter cereals, including wheat, barley and triticale, enabling an earlier forage harvest and more "double crop" options.

Rye also has some limitations. Fall rye grows well on lighter soils, but does not do well on heavier soils when drainage is poor. Winter wheat would be a better forage option on heavier, poorly drained soils. Forage rye is higher yielding, but not as palatable as winter wheat.

Double Crop Options
Some farmers that are looking for extra stored forage are planting fall rye after the corn silage is harvested. Forage rye harvested in early-May can be followed by a late-planted crop, such as soybeans or possibly a warm-season annual forage crop such as sorghum. Winter wheat heads later than fall rye, about June 5th, making forage wheat harvest too late to be followed by corn or soybeans. Decreased moisture in the soil profile following forage rye harvest can potentially have a negative effect on the yield of the following crop. It is important to completely kill the rye with glyphosate or tillage to minimize any shading and competition for moisture.

Rye is noted for having an "alleopathic effect" that suppresses the germination and growth of weeds and other crops. How significantly the potential alleopathy will lower the yield of the following crop depends on a number of factors, but because most of the residue is removed, it is low risk in most forage rye situations. The exception may be with no-till corn on heavier soil types. Soybeans and edible beans following forage rye suffer almost no yield loss.

Seeding
Fall rye is easy to establish and can be seeded from late-summer to late-fall. If fall pasture is desired, fall rye should be seeded by August 15-30th. If harvest as silage the following May is planned, fall rye should ideally be seeded in late-September, but later seedings can work on sandy soils. Although rye is the most tolerant of the winter cereals to late planting, it should be in the ground by late October. Some growth going into winter is required for early spring growth and good yields.

If planted as a grain crop, fall rye should be seeded at 100 lbs per acre, but if it is to be used for forage, the seeding rate can be increased up to 168 lbs per acre (3 bu/ac). Use the higher seeding rates if broadcast rather than drilled, or if the seeding date is very late.

Grazing
Fall rye can provide good opportunities to extend the grazing season into late-fall and early-spring. Fall rye can be grazed 7 weeks after seeding, or when there is about 5 - 8 inches of top growth. If grazing in the fall, applying 50 lbs per acre of nitrogen at planting will stimulate growth. Nitrate poisoning can be a potential risk if high amounts of nitrogen have been applied. Although it can be grazed after frost, fall pastured rye should be allowed to go into winter with 2-3 inches of growth.

Fall rye is ready to graze early in the spring, about 10 - 12 days before wheat. Spring growth is very rapid so to ensure that the rye does not get too mature, be prepared to move livestock frequently in a strip grazing system. Grazing rye on wet heavy clay soils in late-fall and early-spring conditions is not recommended because of livestock "pugging" and compaction.

Haylage
Fall rye can be made into good stored feed by cutting, wilting and making it into silage, either in tower, bunk, pile or bag silos. Wrapped baleage also works well. Fall rye cut at the desired stage is extremely difficult to dry sufficiently to be made into dry hay.

Nitrogen applied at 45 – 70 lbs/ac in the spring at green-up will stimulate tillering and increase forage yield.

The timing of cutting is critical to quality and palatability, so the optimum harvest window is very narrow. Forage quality and palatability drop very quickly (faster than other cereals) at the heading stage. Rye should be harvested for forage at an earlier stage than other cereal crops to ensure palatability and intake.

It is recommended to target harvesting forage rye at the **early-boot stage** (prior to heading), which generally occurs during May 1st - 20th in southern Ontario. At this stage, a dry matter yield of 2 tonnes per acre is typically possible. However, there can be a very large range in forage quality with only a few days difference in harvest. At the early-boot stage (Zadok 39 - ligule of the last leaf just visible), CP can approach up to 18% (depending on the amount of nitrogen fertilizer applied), with NDF under 50%. At the head-emerged stage (Zadok 59), CP drops to the 13-14% range, while NDF increases to over 60%. This will likely be adequate for heifers, dry cows and beef cows, but will not be dairy cow quality.

When rye is cut later, at the early-dough stage, the yield may approach 3 tonnes per acre, but the quality, palatability and intake will be much poorer. Delaying forage rye harvest past the boot stage because of bad weather or competing field crop activities is not very forgiving.

For more information, refer to the OMAFRA Forage Website at www.omafra.gov.on.ca/english/crops/field/forages.html.

Recording the 2005 Pasture Season

by Jack Kyle, Provincial Pasture Specialist, OMAFRA, Lindsay

Have you recorded the events of your 2005 grazing season? Most of us are notorious for not writing down what happened when it happened. Yet these notes are essential for the best pasture management decisions for future years.

Each pasture season is somewhat different than the previous ones. Lots of rain makes for high yields of green grass, yet cattle gains are rarely as impressive as the grass growth. In a dry year, we expect the gains will be very low, and yet at weigh-off the gains are often better than expected. The amount and timing of rainfall has a big impact on forage growth, and 2005 was a year with great variation in amount and timing.

A good set of records that provide details of what has happened will allow you to accurately compare one year to the next. A pocket notebook and/or a three-ring binder can form the basis for a good system. It can be expanded from that point to a complex computer spreadsheet, if you are so inclined.

Your records should include:
- weather data- amount of rainfall, frost dates, and extreme summer temperatures.
- forage or sward information on species mix in the pasture, and plant density
- fertilizer applied
- pasture growth at different times during the grazing season
- livestock information including size, type and number of animals, beginning and ending weights
- grazing duration, stocking densities and frequency of moves to new paddocks
- beginning and ending dates of the grazing season
- amount of residual forage and condition of pasture at end of season, and
- amount and timing of any supplemental feed required.

A long list, but all these factors play a role and are essential notes in the record system.

There are a number of tools to assist in measuring the amount of forage present. Height and density are the two important components. The use of a grazing stick will help in determining the quantity of forage present, and improve estimates of forage amounts in your record keeping system.

Recording and accumulating this information will allow you to make accurate comparisons between years, allow you to analyze this year's results, and make grazing decisions that will have a positive benefit to your operation.

Each year is different in the grazing business, but analyzing your own management decisions will help keep the grass growing and your grazing enterprise profitable.